The Impact of Windows 10 on the Computer Industry

An Honors Thesis (HONR 499)

By

Andrew Schmidt

Thesis Advisor
Dr. Catherine Chen

Signed

Ball State University
Muncie, Indiana

May 2016

Expected Date of Graduation

May 2016

Abstract

Microsoft's Windows Operating System has been a driving force within the Personal Computer Industry. In recent years, however, that industry has started to struggle due to both internal and external factors. The release of the latest version of Windows, Windows 10, comes at a critical time for the industry. This thesis analyzes Windows 10's overall effect on the PC Industry by looking at Personal Computer sales before and after Windows 10's release as well as Windows 10's own success by studying Personal Computer Operating System market share.

Acknowledgements

I would like to thank my advisor, Dr. Catherine Chen, not only for helping me get through this project but also for the Computer Information Systems classes I took with her, which I thoroughly enjoyed. I would also like to thank Dr. Melody Alexander, as without her I would not have switched my major to Computer Information Systems.

Introduction

Anyone who has ever used a computer has an opinion about Windows. Some people love it, taking advantage of its many features to get work done efficiently. Others point out Windows' flaws and how their own operating system of choice has fixed them. And some only know to click the "e" icon to get to the internet. No matter your skill level, Microsoft Windows can be a valuable 'window' into the computer world.

When Microsoft announced Windows 10, people got excited. Many people hoped that, if Windows 10 was well-received by users, it would help reinvigorate the PC Industry. Sales for desktop and laptop computers had slumped in recent years, partly due to competition with tablets and smart phones. However, the poor reception to Windows 10's predecessor, Windows 8[1], certainly had not helped. Windows Operating systems controlled roughly 90% of personal computer operating systems market share during 2015. The rest of the market is comprised of Apple's Mac OS X at roughly 7% and Linux, a free, open-source operating system at roughly 1.5% during 2015 ("Desktop Operating System Market Share"). Without any close competitors, the success of Microsoft's most well-known product drives the success of the PC industry as a whole.

Therefore, consumer dissatisfaction with Windows 8 certainly played a role in the decline in PC sales. Computer manufacturers were hopeful that Windows 10 would help increase demand for new PCs. HP's Vice President of Portfolio Strategy and Customer Experience, Mike Nash, said that "people need a reason to buy a new computer" and believed that Windows 10 could be that reason (Jackson). Other factors were lining up that could really help drive PC sales. An estimated 600 million people used outdated computers that needed to be upgraded, but those users had been turned off by Windows 8, which Nash admits had issues (Chacos, "Deflating Apple's hubris"). These users might be more willing to

---

[1] Windows 9 does not exist.

upgrade their computer systems once Windows 10 becomes an option so that they could avoid the frustrations of Windows 8.

However, in a shocking twist during a press conference on January 21st, 2015, Microsoft announced that Windows 10 would be a free upgrade for existing Windows users using Windows 7 or 8 (Chacos, "Windows 10 is a free"). This created an interesting dilemma: would users choose to buy a brand new computer or would they simply keep their older computer and upgrade to Windows 10 for free? Microsoft intentionally designed Windows 10 so that its system requirements are low enough that most computers designed for Windows 7 or 8 would also be able to run Windows 10 (Jackson). However, that still discounted people using even older computers, as many PC users were still using Windows XP-era hardware. Would there be enough demand for new Windows 10 computers to make any significant improvement in PC sales?

Short answer: no. Initially, the purpose of this thesis was going to be an analysis of Windows 10's effect on PC sales. However, it is undeniably clear now that Windows 10 did very little to change the PC Industry's slow descent. Figure 1 shows PC sales in thousands of units from First Quarter 2012 to First Quarter 2016. Although the industry seemed to stabilize itself between 2013 and 2014, in 2015 it took another major dive, despite Windows 10's release during that year. Hewlett-Packard Chief Executive Dion Weisler said that HP has "not seen the anticipated Windows 10 stimulation of demand that we had hoped for, and we're carefully monitoring any sort of price development that could further weaken demand" (Hackman, "HP chief: Windows 10"). Clearly, most Windows users would rather just keep their old computer and upgrade for free than spend money on a new computer, which is not surprising.

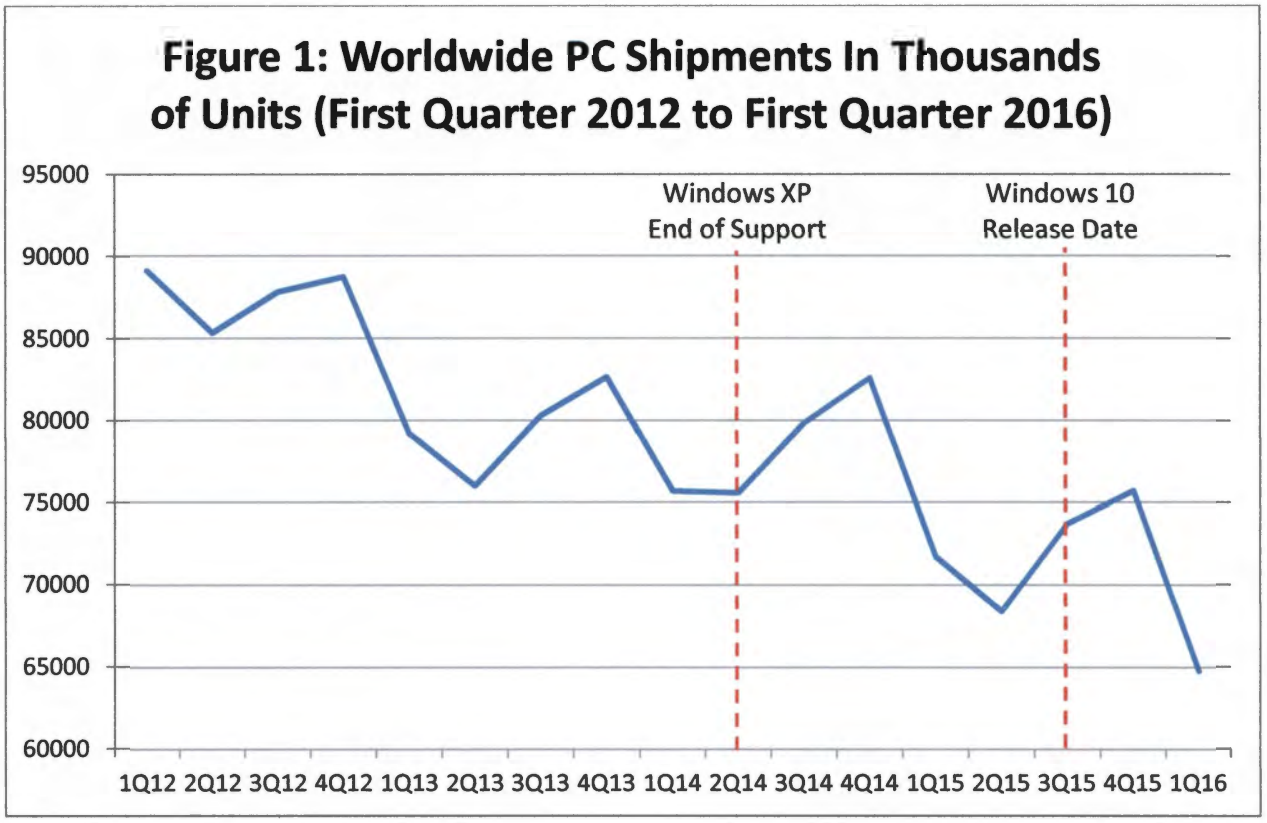

Figure 1: "Gartner Says Worldwide PC Shipments in the First Quarter of 2013 Drop to Lowest Levels Since Second Quarter of 2009;" "Gartner Says Worldwide PC Shipments in the Second Quarter of 2013 Declined 10.9 Percent;" "Gartner Says Worldwide PC Shipments in the Third Quarter of 2013 Declined 8.6 Percent;" "Gartner Says Worldwide PC Shipments Declined 6.9 Percent in Fourth Quarter of 2013;" "Gartner Says Worldwide PC Shipments in the First Quarter of 2014 Declined 1.7 Percent;" "After Two Years of Decline, Worldwide PC Shipments Experienced Flat Growth in Second Quarter of 2014, According to Gartner;" "Gartner Says Worldwide PC Shipments in the Third Quarter of 2014 Declined 0.5 Percent;" "Gartner Says Worldwide PC Shipments Grew 1 Percent in Fourth Quarter of 2014;" "Gartner Says Worldwide PC Shipments Declined 5.2 Percent in First Quarter 2015;" "Gartner Says Worldwide PC Shipments Declined 9.5 Percent in Second Quarter of 2015;" "Gartner Says Worldwide PC Shipments Declined 7.7 Percent in Third Quarter 2015;" "Gartner Says Worldwide PC Shipments Declined 8.3 Percent in Fourth Quarter of 2015;" "Gartner Says Worldwide PC Shipments Declined 8.3 Percent in First Quarter of 2016;"

Instead, this thesis will look at Windows 10's own success or failure, primarily analyzing its presence in the market share for personal computer[2] operating systems. To fully understand the complex situation that the PC industry is in today, it is necessary to take a look back at the history of Windows operating systems.

[2] Often, the term Personal Computer is used to refer to only computers running Microsoft Windows in contrast to computers running Apple's Mac OS. However, that definition is technically incorrect, as Apple Macs are still personal computers. Therefore, for the rest of the article, the term Personal Computers will refer to any laptop or desktop computer, no matter what operating system it runs.

Windows XP: Striking Gold

The first few years of the 21st century were an important time for the Personal Computing industry. Although the industry had existed for quite a while, this was the time that PCs were finally becoming affordable for a wider audience. At the same time, more and more people and businesses were investing into computer systems across both America and Europe (Cawley). Personal computers were finally starting to reach mass appeal, with many users being first introduced to computers around this time.

Enter Windows XP, which Microsoft released in Fall 2001. Windows XP marked huge changes for Microsoft's Operating System business. First of all, it was the first Windows OS to not be based on DOS, a command-line based Operating System for which previous versions of Windows had acted as a visual interface (Hachman, "Windows XP passes away"). By dropping this limitation and replacing it with the Windows NT kernel, Microsoft was able to vastly improve the performance and stability of Windows XP compared to its predecessors (Coursey) . The other major difference centered around Microsoft's business model. In the past, Microsoft had released separate business and consumer operating systems, but with Windows XP they merged the two categories (Cawley). This helped promote a more unified experience for consumers and minimized confusion. A combination of these changes with an overall focus on user friendliness resulted in an operating system that was easy to learn and use, something important as more and more people started using computers for the first time. Ross Rubin, an independent analyst who has tracked Windows for various financial groups, said, "It was certainly one of the strongest in terms of market appeal. What made XP really significant is that it brought together the reliability ... with the consumer friendliness and driver support" (Cawley).

Upon release, Bill Gates called Windows XP "the best operating system Microsoft has ever built" (Hachman, "Windows XP passes away"). Consumers seemed to think the same way, as Windows XP went on to become one of Microsoft's best-selling products. Part of Windows XP's success was that it

was released at exactly the right time: as previously discussed, the Personal Computer industry was booming and there were many new computer users. As a result, Windows XP was used everywhere, from "car assembly plants to managing airport luggage" (Cawley). The Operating System's ease-of-use was perfect for those just now learning their way around computers (Hachman, "Windows XP passes away"). For many individuals, Windows XP was their first experience on computers, including their first introduction to the World Wide Web with the bundled Internet Explorer. At its most popular point, Windows XP controlled three-fourths of the Desktop and Laptop computer market share ("StatCounter Global Stats").

Many people, viewing XP through the rose-colored glasses of nostalgia, forget that Windows XP was not perfect. Early in the OS's life, security was a huge problem. It seemed like new exploits were cropping up daily. However, in 2004, Microsoft released Service Pack 2 that fixed a wide variety of these problems and made XP much more secure ("Windows 7 Review").

Clearly, Microsoft had struck gold with Windows XP, providing exactly the operating system the world needed at the right time. However, that success would come back to haunt Microsoft in the future, as they would struggle to live up to Windows XP's achievements with future releases.

Windows Vista: The Unworthy Successor

Windows Vista launched in late 2006, five years after XP. Microsoft had been building up the new Operating System quite a bit, spending an estimated $500 million on advertising that even featured basketball superstar LeBron James in a commercial (Bulik). During development, Microsoft focused on implementing better security (a major flaw in XP) and redesigning the interface with the new "Aero" theme while looking to support new technology like 64-bit processors (Derene). However, these new features could not distract from Vista's major flaws. Most prominent among those issues was poor support with hardware drivers, causing Vista to work sporadically depending on the internal hardware of the computer. Ironically, driver support was something Windows XP was known for doing very well

(Hachman, "Windows XP passes away"). Microsoft blamed the rest of the industry on this point, saying that hardware manufacturers just were not ready to support Vista; however, much of the blame still fell on Microsoft for not sufficiently working with vendors and for releasing Vista despite knowing about these issues (Horowitz).

A variety of other problems were prevalent. Users felt that Vista was much stricter than XP and allowed for less freedom (Cawley). Many pre-Vista apps had unexpected compatibility issues (McMillan). Vista's system requirements were very high compared to XP, meaning many users running XP could not upgrade to Vista because their computers were not powerful enough to display the advanced visuals of Aero (Miller). These and other problems led to many industry experts suggesting that users wait to upgrade until the first service pack was released. Eventually, after some delay, Microsoft did release patches to fix many of the issues (McMillan; Horowitz). However, it was too late. Consumers had lost faith in Microsoft.

Many of the issues stemmed from Microsoft releasing Vista too early. Although the OS had already been delayed multiple times, it clearly was not ready in time for the release date (Bulik; Horowitz). If Microsoft had delayed the OS again, it might have made consumers frustrated in the short run, but the long-lasting tragedy that hurt Microsoft's reputation could have been avoided. If Microsoft had spent more time testing Vista to find and patch bugs as well as worked more closely with software makers and hardware vendors to ensure compatibility, Windows Vista could have been a great follow-up to Windows XP instead of a stain on Microsoft's history.

Another part of the problem was that users had become overly attached to Microsoft XP. There was a five-year gap between the releases of XP and Vista, the longest period between Windows releases ever. Because of this long wait, users became more and more comfortable with Windows XP, and less open to change. When Vista was released and reports revealed the numerous technical issues, it just made consumers cling more to Windows XP. They had worked with XP so long that it was familiar to

them. They knew how to handle its quirks and its qualms. Once most of the technical problems with Vista had been fixed, the resulting Operating System was fairly solid, definitely "better" than XP. However, "better" is relative. To the plethora of users who had gotten their start on Windows XP and had been using it for the last five years, Windows XP was all they really wanted. It worked for what they needed it to do and that was all that mattered, so why go through the trouble of learning a new Operating System if it did not have any noticeable benefit to them? Technology enthusiasts might care enough about getting the most performance and efficiency, but normal people not so much.

This would become the biggest issue that Microsoft would face for the next decade: convincing everyday users to upgrade. Unfortunately, it would be a problem to which Microsoft would not easily find a solution.

Windows 7: Fixing Mistakes

Microsoft realized that customers had rejected Windows Vista. Demand for new computer systems running Windows XP instead of Windows Vista was so high that companies like Dell started offering XP again (Larkin, "Vista Resistance"). Despite the fact that Microsoft had fixed most of the problems with Windows Vista, the Vista name was just too tarnished.

So Microsoft started work on their next Operating System release. However, this OS would not be a major upgrade, but instead a minor release more like a service pack with new features added (Miller). The result was Windows 7, which released in October 2009, just under two years after Vista had released (Miller). Windows 7 built on top of Vista, upgrading the OS with new features and fixing the various issues. Microsoft had done similar things in the past, most notably with Windows 95 and Windows 98 (Miller). However, because it was packaged and advertised as a new operating system, downplaying that this was just an improved Vista, the association in consumer's minds between Windows 7 and Vista was broken (Miller).

Many of Windows 7's improvements included tweaks and changes to the user interface, but it also improved search capability and sped up responsiveness ("Windows 7 Review"). It also included DirectX 11, the latest version of the graphics technology that Windows is known for and has contributed to Windows' dominance in the PC gaming market ("Windows 7 Review").

Overall, the response to Windows 7 was very positive. Clearly, Microsoft had listened to the feedback to Windows Vista and taken the criticisms to heart, making sure that Windows 7 was what users needed. MaximumPC called the OS "a successor worthy of Windows XP" ("Windows 7 Review"), while PCWorld said it "has a minimalist feel and attempts to fix annoyances old and new" (McCracken). Consumers seemed to like it too.

Six months after launch, Microsoft announced that Windows 7 was installed on one in ten PCs in the world and that they had sold 100 million licenses, meaning Windows 7 was now the fastest-selling Windows OS (Ferguston). Despite its failures, Vista was not bad enough that people completely abandoned Microsoft. Windows 7 is a testament that if you treat users right and give them what they want, they will grant forgiveness and be satisfied.

Windows 8: Re-Inventing the Wheel

With the success of Windows 7, Microsoft turned to working on the next iteration of the operating system. They took on the ambitious task of "reimagining" Windows. Part of this stemmed from increasing competition from tablets like Apple's iPad and other handheld devices which were taking bites out of the PC industry. Microsoft wanted to better compete with these new devices by making a version of Windows that could work on a much broader set of devices and with improved touchscreen support (Silver).

Windows officially announced Windows 8 in June 2011. The biggest change was the radically different full-screen, tile-based start screen that was designed based on Microsoft's Windows Phone 7 UI (Silver). The full-screen start page was actually originally intended for Windows XP, but was

eventually put on the backburner until now (Hachman, "Windows XP passes away"). Initial reactions were mostly confusion as to why so many tried-and-tested design choices that users were accustomed to were being replaced (Silver). However, critics were still optimistic and assumed that Microsoft knew what they were doing.

Windows 8 officially released in late 2012, three years after Windows 7. Unfortunately, the public was not impressed. Mark Hachman, senior editor at PCWorld, said "my earliest memories of Windows 8 were...of helpless frustration—a common experience, for most" ("A tribute to Windows 8"). The biggest issue seemed to be that everything was so different. Chief among this was the aforementioned Start Screen, replacing the Start menu. The new Start Screen featured a tile-based design similar to Microsoft's mobile operating system. It caused a separation between the Desktop and the Start Menu, creating two separate environments instead of one unified environment that older versions of Windows had with their pop-up window Start Menu. Much of the desktop's functionality was now split between the desktop and the Start Screen (Ackerman). Furthermore, access to the Start menu had been changed. Instead of the now-iconic start button, the Start Screen required either swiping from the edge of the screen or hitting the Windows key on the keyboard. The new 'Metro' apps that were intended to be the new standard for Windows programs could only be launched in full screen mode instead of in resizable windows (Case).

These radical design changes were an attempt to make Windows 8 more flexible for any device. Microsoft had grandiose plans that "27-inch all-in-one PCs, 8-inch tablets, 13-inch flip-and-fold hybrids, midsize non-touch laptops, and everything in between" would be running Windows 8 (Ackerman). However, the result was software that tried to appeal to every use case without fully meeting the needs of any of them.

There were brand new ways of doing simple tasks, like swiping up from the bottom of the screen to see a list of apps that were convenient and helpful. But since nobody was accustomed to doing

those things and the function was not obvious, nobody noticed them at first, making Windows 8 much harder to learn than previous Windows versions (Hachman, "A tribute to Windows 8"). Many of these commands seemed to be built for touch-screen interfaces. Swiping from the edge of the screen seems very intuitive on a touch-screen, but the equivalent with a mouse (clicking and dragging) feels awkward. From a personal experience, it was very difficult to use vanilla Windows 8 with only a mouse and keyboard, not a touch screen. Often, it was necessary to become more reliant on keyboard commands to be efficient. Although keyboard commands are great for power users, they have to be learned and are not always intuitive to more casual users. That observation sums up the main problem with Windows 8: all of the mobile-focused changes caused it to be unintuitive to users familiar with previous versions of Windows.

As would be expected, Windows 8's failure to impress users resulted in poor sales. After a year, it had only amassed a market share of about 8%, much lower than XP, Windows 7, and even Vista ("Desktop Operating System Market Share"). Consumers were likening Windows 8 to Windows Vista. However, it is important to realize that Windows Vista and Windows 8 problems were very different. While Vista suffered from incompatibility and performance issues, Windows 8 actually excelled in those (Case). On the other hand, Vista's redesigned "Aero" interface was impressive and looked very nice. It was well-received enough that it was integrated into Windows 7. Windows 8's interface change, however, is where most of its problems originated. It had changed too radically for normal users to keep track of and focused excessively on touch-based interface. It is easy to assume that Microsoft was making the same mistakes twice, but that is not entirely true. The specific problems differed. What Vista and 8 do have in common, however, is that in a broader sense their issues both come from a failure to understand what consumers want. Microsoft delivered changes they thought that users wanted, but those changes were spurned by those users. Clearly, there was a disconnect between Microsoft and their consumers. Perhaps Microsoft's long-term success in the computer operating system industry had

made them oblivious, without any close competition in this area to keep them attentive. Something needed to change internally within Microsoft, otherwise users would only continue to abandon desktop and laptop computers for other alternatives at a faster rate.

Windows 8.1: Damage Control

Microsoft had a perception problem on their hands. Although Windows 8 had become very well-known, it had a very negative connotation (Ackerman). In an attempt at damage control, Microsoft released Windows 8.1 in October of 2013 as a free update for Windows 8 (Ackerman). Windows 8.1 was not a brand-new operating system but rather more similar to the Service Packs of previous versions of Windows, offering minor tweaks and changes to fix Windows 8's problems. However, Microsoft appeared to treat it as a separate entity from Windows 8 in an attempt to rebrand the OS. In fact much of the data collected for this report mostly lists Windows 8 and Windows 8.1 separately. However, because they are really the same, data for both will be combined when presented in this report.

In the author's opinion, Windows 8.1 made Windows 8 usable with a keyboard and mouse. The most welcome change was the re-addition of the Start Button, finally supplying a visual way to get to the Start Menu from the desktop. As useful as this and other changes were, however, it did not really fix the actual issues. While many frustrating aspects of Windows 8 were fixed, many of the fundamental problems, like the glaring disconnect between the desktop and start screen, were still there. While Windows 8.1 was a major improvement over Windows 8, it still was not acceptable for most users. In their review, CNET strongly recommended Windows 8 users take the free upgrade to Windows 8.1 but cautioned Windows 7 users to just stick with what they had (Ackerman).

The Death of Windows XP

Despite the fact that now three different versions of Windows had launched since it was released back in 2001, Windows XP still played a major force in the computer market. When Windows 7 launched in 2009, XP had around 70% of the OS market share ("StatCounter Global Stats"). It was not

until exactly 2 years later, in October of 2011, that Windows 7 surpassed XP, which had now dropped to under 40% of the market share. This change apparently was due to Windows 7's positive reception as compared to its predecessor, Windows Vista. By Windows 8's release in 2012, XP was now under 30% of the market share ("StatCounter Global Stats"). Although XP usage was dropping, the fact that a decade-old operating system, which was growing more and more obsolete, had such a large presence underlined how Microsoft's 2001 success was now hurting them.

Windows XP die-hards represented an unreached customer base for Microsoft. These were people who did not see it necessary to upgrade to newer Operating Systems, or more realistically, newer computers. Therefore, they represented lost sales, opportunities to sell brand new Windows computers that were being missed.

However, even worse was that Windows XP was obsolete. Now over a decade old, the operating system had long been showing signs of its age. Microsoft was still supporting XP with security patches, but their policy for previous versions of Windows had been to eventually stop supporting them. Of course, with those older versions, very few people were still using them when the cutoff date rolled around. Windows XP was a vastly different story. Microsoft had years earlier established that April 8th, 2014 would be the last day for security patches for XP. After that date, any new vulnerabilities found in Windows XP would not be fixed, meaning that Windows XP systems would be extremely vulnerable to malicious software and hackers. Not a big problem if only a handful of users were still using the operating system, which is surely what Microsoft had expected when they had set that date. However, that was not the case: as 2014 approached, Windows XP was still the second most-used operating system, only surpassed by Windows 7 ("StatCounter Global Stats"). Despite no longer holding the top spot, Windows XP systems came under attack six times as often as Windows 7 computers, according to security firm Avast (Paul, "Windows XP holdouts").

Microsoft started pushing Windows XP users to switch as early as 2011. In a blog post, Microsoft encouraged users to "Celebrate a Decade of Windows XP by Moving to Windows 7[3]" (Reynolds). They published an info graphic comparing Windows XP to other outdated staples of the early 2000s like flip phones and the TV show "Friends" (Paul, "Windows XP: Pros and Cons"). Windows XP's market share started to creep down, but not fast enough, as shown below in Figure 2.

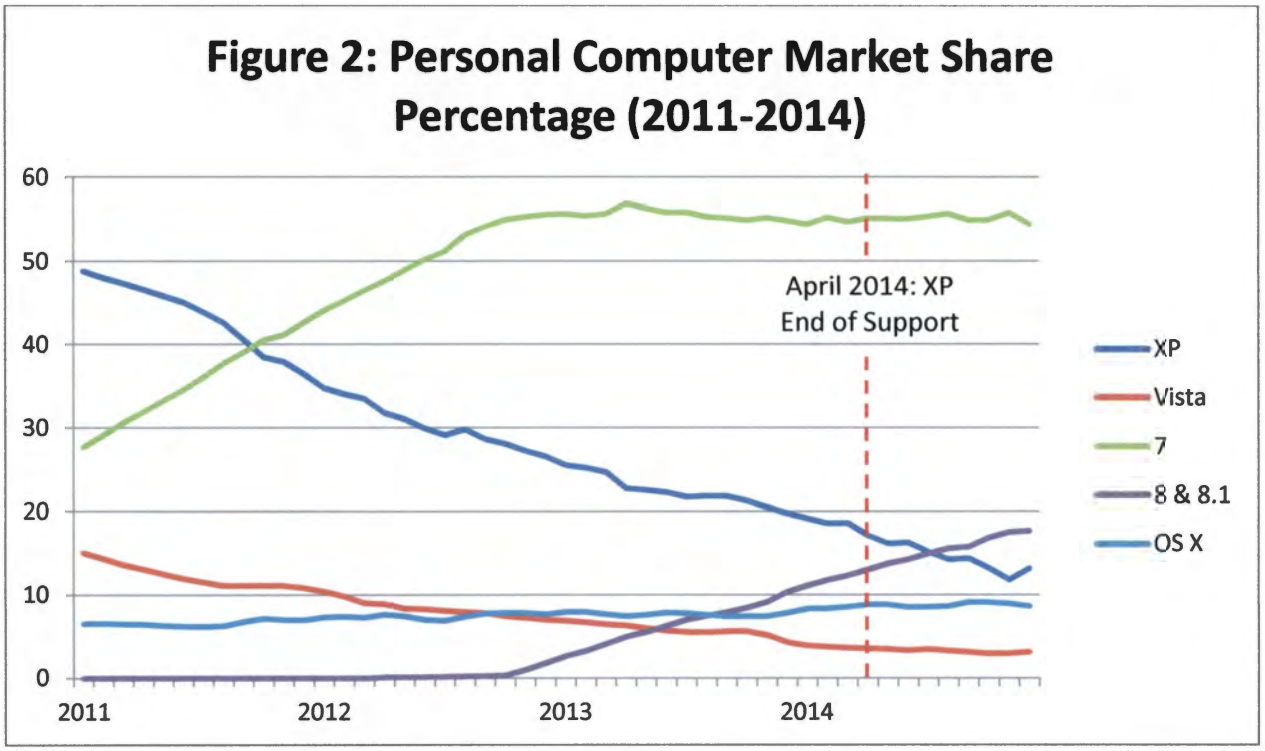

Figure 2: "StatCounter Global Stats;"

To many of these consumers, Windows XP had been the first Operating System they had ever used and giving it up seemed ridiculous. To others, computers were akin to home appliances like fridges or microwaves: you keep using it until it breaks (Paul, "Windows XP holdouts"). Why spend money to replace something that still works? For the technology illiterate who do not fully understand computer security or how hardware and software age and become obsolete, the need to upgrade seems rather ridiculous. One user, when asked if his Windows XP computer was set up to download patches and updates, replied "No, we just use it for very basic Internet use. I don't even know what a patch is"

[3] Windows 8 would not release for another year, which is why Microsoft was still pushing Windows 7.

(Hachman, "Windows XP passes away"). Another user stated "I stopped the security updates in XP years ago and yet I have never been infected... I am sticking with XP" (Paul, "Windows XP holdouts").

It did not help that the current face of modern Windows Operating Systems was Windows 8, whose unfavorable reputation preceded it. XP users would certainly be some of the most resistant to all the changes in Windows 8. In fact, demand for an alternative to Windows 8 computers, fueled by those switching from XP, pushed some manufacturers like Hewlett-Packard to begin offering Windows 7 computers again (Musil). Windows 7 was a much better alternative for these users because it was much more like the Windows they knew and loved, yet it was still different enough that many casual users would probably still struggle.

Eventually, April 2014 came. During that month, Windows XP still represented roughly 17% of the PC OS market share, second place to Windows 7 at 55% and ahead of Windows 8 and 8.1 combined (13%) and Apple's OS X (9%) ("StatCounter Global Stats"). Despite all of Microsoft's efforts to convince users to switch, they were unable to persuade a large number of users to abandon the now-dead platform. As of the time of writing this report in 2016, Windows XP still runs on over 7% of active computers, having now fallen to fifth place ("StatCounter Global Stats"). This represents millions of computers that are vulnerable to exploit. However, unlike previous Windows Operating Systems that only had a handful of people using them after the end-of-support date, the large number of Windows XP users has validated any nefarious efforts spent creating malicious software targeting the XP system as being worth the effort. Overall, the Windows XP situation has been a disappointing failure for Microsoft. Their greatest success ended up hurting their reputation a great deal.

Windows 10: A Change of Strategy

With the disappointment of Windows 8 and the Windows XP debacle, Microsoft was in a tough position. It had ostracized its customers: people started wondering if Microsoft even knew what users wanted anymore. Could Microsoft win the hearts of their users back?

Microsoft announced the next version of Windows on September 30th, 2014: Windows 10. What happened to Windows 9? Multiple theories have floated around, but during the announcement event it was said that Windows 10 is not an incremental update to Windows, but instead a monumental leap forward (Davis). Despite the odd name choice, change was clearly in the air with Microsoft. Terry Myerson, Executive Vice President of Microsoft's Windows and Devices Group, said "Windows 10 embodies what our customers (both consumers and enterprises) demand". However, this was not simply marketing jargon: it seemed that Microsoft was truly interested in getting their customer's perspective.

During the announcement event, Microsoft announced the Windows Insider Program, an open beta of sorts where "PC experts and IT Pros can get access to a technical preview of Windows 10 for desktops and laptops" (Myerson). This was open to anyone who wanted to try the Operating System before release, a first for the Windows line of Operating Systems, although Microsoft did warn that this was for people "comfortable using pre-release software with variable quality" (Myerson). Microsoft said the program was an invitation for their "most enthusiastic Windows customers to shape Windows 10 with us. We know they're a vocal bunch - and we're looking forward to hearing from them" (Myerson). This feedback was actually used: suggestions like changing how the charms button looks on Modern Windows Apps to make it more obvious and allowing users to pause after saying "Hey Cortana" to activate voice commands, just to name a few very simple examples (Sawaya).

However, even before this program started, Microsoft had clearly been listening to the critical backlash against Windows 8. During the announcement event, Microsoft revealed a slew of features for which people had been begging. Most significant was the return of the old Start Menu, this time updated to feature a customizable area for live-tiles from Windows 8 (Myerson). This allowed for more customization than ever before as users now had greater control over what appeared on the menu and where it was located. Another major problem with Windows 8 was now repaired relating to the modern

Metro apps, which originally could only be run in full screen. These would now launch in resizable windows like normal programs in Windows 10. The biggest disappointments from Windows 8 had already been fixed (Myerson).

As already discussed in the introduction of this thesis, many people expected that Windows 10 might breathe life back into the slowly dying PC industry. However, Microsoft announced on January 21st, 2015, that Windows 7 and Windows 8.1 users would be able to upgrade to Windows 10 for free, which certainly encouraged people to just upgrade instead of purchasing new hardware. That upgrade opportunity would last for a year after launch, after which Windows 7 and 8.1 users would have to buy Windows 10 to make the switch (Chacos, "Windows 10 is a free"). There was a lot of confusion over this, with many people incorrectly interpreting the offer as being that Windows 10 would be free for a year, after which anyone who upgraded would have to pay. However, this was not the case (Chacos, "Windows 10 is a free"). Microsoft likely did this for multiple reasons, but the chief one was probably that they wanted to keep Windows 7 from become a problem like XP had. At the time, Windows 7 was still sitting at its peak of around 55% market share, which although not quite as high as Windows XP's peak point, was still rather impressive ("StatCounter Global Stats"). Microsoft established that Windows 7's Extended Support will end on January 14th, 2020, five years from the date that Microsoft had announced that Windows 10 would be a free upgrade for those Windows 7 users ("Microsoft Support Lifecycle"). Microsoft was trying to give people a reason to abandon Windows 7 before that end date. It had taken so long for Windows XP usage to creep down, and Microsoft hoped that this free upgrade option would encourage people jump ship before it sank.

However, people would only take that opportunity if Windows 10 was any good. TechRadar jokingly said that Windows 10 would be more popular than Windows 8 because it was not Windows 8 (Cobbett). However, any major issues like Windows 8 and Vista had would cause people to steer clear of Windows 10, while minor ones would be enough to hurt adoption rates. To make people aware of the

offer, Microsoft patched into Windows 7 and 8.1 an app that periodically informed users of the upgrade opportunity.

Windows 10 launched on July 29th, 2015 (Chacos, "Windows 10 is a free"). Of course, the launch was not entirely smooth. Many users reported a plethora of bugs, most notably errors while updating from Windows 7 or 8 that simply said "Something happened" without giving any more context (Blair). However, these kinds of issues are to be expected with the launch of such a huge piece of software. Microsoft implemented a staggered rollout to keep up with demand, so most people waiting for the operating system did not get the chance to upgrade on July 29th but instead were granted the opportunity sometime over the next few weeks (Chacos, "Windows 10 is a free").

Early impressions seemed reasonably good. Adobe's Digital Index tracked and categorized social media responses to Windows 10 based on the emotional context of those responses. In the first 24 hours, 44 percent were categorized under "joy or admiration", 20 percent under "surprise", and 6 percent under “anticipation”. The other 30 percent represented "sadness" (Blair). Based on this interpretive data, it would seem that the overall response to Windows 10 was positive, yet many were not convinced. Microsoft would still need to persuade many users that Windows 10 was a good operating system.

Unfortunately, Microsoft made many controversial decisions with Windows 10 that worried potential users. Chief among them involved privacy. Many users felt that the default settings in Windows 10 were violating users’ privacy, including giving Microsoft permission to create an advertising ID associated with the email address affiliated with each user account, and thereby tailoring ads for web-browsing and other applications based on the user's browsing history. Another feature, called Wi-Fi sense, automatically saves your wi-fi password to the cloud and allows any of your social media contacts to automatically connect to your personal wi-fi. Thirdly, Windows 10's personal assistant, Cortana, automatically collects data when users use her, similar to Google and Apple's personal assistants

(Forrest). Many of these, although extreme, are fairly common practices by technology companies today. However, most troubling was how Microsoft planned to use the data it collected. According to the Windows 10 privacy policy, Microsoft "will access, disclose and preserve personal data, including your content (such as the content of your emails, other private communications or files in private folders), when we have a good faith belief that doing so is necessary to protect our customers or enforce the terms governing the use of the services" (Forrest). Many users believed that this statement was too open-ended and would allow Microsoft to use their personal information in any way they pleased. While most of these features can be switched off in settings, the settings are somewhat difficult to find for the casual user and probably should not have been turned on by default. Although Microsoft has assured users that they will not distribute the information collected, the company has continued to add new anti-privacy features after Windows 10's launch. Ads on the Windows 10 Lock Screen and Start Menu and pop-up notifications telling the user to get Microsoft Office and Skype have started appearing for some users (Chacos, "7 ways Windows 10 pushes ads"). These tactics reveal that Microsoft still plans to reap financial gain from users accepting the free upgrades by using Windows 10 as an advertising platform.

Another concern was how much Microsoft was pushing Windows 10. On one hand, Microsoft needed to get the word out somehow, yet some of their tactics have become suspicious. The "Get Windows 10" app, which Microsoft added to Windows 7 and 8 via a patch, originally informed users that they could "preorder" Windows 10 to get priority treatment during the staggered rollout. However, subsequent to Windows 10's release, Microsoft has altered the app's functionality to be more annoying and even deceitful, leading Brad Chacos, senior editor for PCWorld, to call it malware-like ("You will upgrade to Windows 10"). For example, the app originally opened a small notification on the system tray but has evolved into a nearly full-screen pop-up window which gives users two options: "Upgrade Now" or "Start Download, Upgrade Later". Microsoft's approach tried to force users to update by

pretending there was no other option: although the window could be closed via the standard X button, there was no option to click “no thanks”, as the pop-up would just re-open later (Chacos, "You will upgrade to Windows 10").

Clearly, though, these dubious tactics still were not driving up the upgrade numbers enough. Microsoft announced that on February 1st, 2016, they would push the Windows 10 update as a recommended update. Under the default settings for Windows, recommended updates are automatically installed. Although Microsoft did say that you will be able to opt-out of the installation, the update will still automatically download on your computer (Chacos, "You will upgrade to Windows 10"). These strong-arm tactics seem to rely on duping people into upgrading instead of letting them choose.

Despite these issues, Windows 10 was overall fairly well received. CNET said that "Windows 10 delivers a refined, vastly improved vision for the future of computing with an operating system that's equally at home on tablets and traditional PCs" (Ralph). Techradar proclaimed that, "feature-wise, Windows 10 is the new Windows 7. It's robust, pleasant to use, and - perhaps best of all - free" (Grabham). Reviewers praised it for its new features, its speed, and perfectly blending the best of Windows 7 and Windows 8 (Ralph). However, Windows 10's ultimate success would not be judged by technology experts but by the masses choosing whether or not to upgrade.

PC Gamers: A Growing Market

There is a specific submarket of computer users that will be analyzed separately from the rest, partially based on the author's interest in that submarket as well as many interesting circumstances concerning Windows 10 that have happened recently within the submarket. That market is the PC Gaming Industry. Despite dwindling PC sales, sales of high-end gaming computers and graphics cards have stayed strong and continues to grow, showing the continued popularity of this industry (M. Smith).

Windows has long dominated the PC gaming market, likely because it has long been the majority holder in the wider PC market as well. Historically, game developers have targeted Windows users to reach a wider audience. That audience has continued to grow larger and larger, with PC gaming sales exceeding console sales in 2013. Of those PC game sales, 92% were digital sales as compared to physical sales (Shaw-Williams). Of the various digital distribution methods for PC games, the most popular by far is Steam, a digital game store and DRM (Digital Rights Management)[4] service run by game developer Valve. As of February 2015, Steam had 125 million active user accounts worldwide and reached a new milestone when 12.5 million people were logged into the service at the same time on Halloween 2015 (R. Smith; Makuch).

At the time of this writing, Steam lists 16,956 products available on their web store. By filtering those results to include only Windows-compatible games, 16,929 results appear, while searching only for Mac OS yields 6,358 results and 3,947 for Linux. Accordingly, 99.8% of games on Steam support Windows, while 37.6% support Mac and only 23.3% support Linux ("Steam Search"). Consequently, roughly 95% of Steam users use Windows, compared to 90% among all computer users ("Steam Hardware & Software Survey"). It seemed that Microsoft Windows and PC gaming were inseparable, which is why the announcement of SteamOS made big waves.

In September of 2013, Valve, the owners of Steam, announced SteamOS, a Linux-based operating system designed to make PC gaming more open and so that PC games could be played more easily in living-room environments to better compete with consoles. Because it was based on Linux, an open-source operating system, SteamOS would be completely free. However, it also meant that Steam's vast library of Windows-only games would not work on their new OS; only those that were specifically programmed to support Linux would. However, Valve stated that they were already working with media services and game developers to encourage better Linux support (Wilde, "The pros and cons of

---

[4] Digital Rights Management (DRM) refers to tactics and systems designed to keep users from stealing or pirating software.

SteamOS"). If SteamOS caught on with PC gamers, it could mean more Linux games and could dethrone Windows' favoritism in PC gaming.

Tyler Wilde, writer for PC Gamer, called Valve's announcement a declaration "that Windows is not our master" and said that "SteamOS is as much about ditching Windows as it is putting PC gaming in the living room" ("The pros and cons of SteamOS"). At the time, the relationship between PC gamers and Microsoft had been somewhat strained. Microsoft also owned the Xbox brand, one of the three main console brands that competed with PC gaming, which Microsoft often seemed to favor over PC gaming. Microsoft's previous foray into PC Gaming, a DRM system called Games for Windows Live, was known for poor performance and therefore was despised by users (Dransfield). That service was shut down by Microsoft on July 1st, 2014, which unfortunately meant that any games using DRM could no longer be played (Dransfield). At that point, Windows 10 was a year away from being announced, so PC users were still frustrated over Windows 8's disappointments. DirectX, the graphics API created by Microsoft and a big reason why many games could not support Mac or Linux, had not had a major update since DirectX 11 that came out with Windows 7, and indications from Microsoft suggested that further development on DirectX might have stopped. Alternatives to DirectX were cropping up, like AMD's Mantle, a low-level graphics API that promised more optimization control for developers (Chacos, "AMD's low-level Mantle graphics"). All of these factors were threatening Microsoft's hold on the PC gaming industry.

So it was hardly a surprise that Microsoft announced a bunch of gaming-centric features for Windows 10. Phil Spencer, vice president of Microsoft's Xbox division, said that "In a lot of ways they've [Valve] focused more on PC gaming than we have, and for me that's something inside the company that we'll have a renewed focus on - Windows and PC gaming inside of Microsoft is definitely happening" (Ron). The first big change was DirectX 12, which would be Windows 10 exclusive. According to Spencer, DirectX 12 would increase performance by up to 50% in games (Wilde, "Will Windows 10 be good for

gaming?"). It is important to note that games have to be programmed with DirectX 12 in mind, so only newer games that support DirectX 12 would see this supposed boost. Other new features included an Xbox app for Windows 10 that allows users to manage Xbox games and use the Xbox social network from a Windows 10 PC (Sherr). Although those features are fairly useless to PC gamers unless they also own an Xbox One, the app also features a DVR system for capturing, editing, and sharing PC game footage (Wilde, "Will Windows 10 be good for gaming?"). Microsoft also announced plans for cross-platform play between PC and Xbox One so that gamers on those systems can play with and against each other in multiplayer, and after Windows 10's release, Microsoft revealed that games could be developed simultaneously for Windows 10 and Xbox One using the new Universal Windows Platform ("Microsoft reveal cross-platform plans"; Protalinski). While many of these features were good, it was clear that Microsoft was trying to bring PC gaming more under its control by unifying it with their Xbox brand. It remained to be seen if PC gamers, who thrive on freedom from the restrictions that consoles have, would accept these changes or not.

Methodology

On July 30th, just 24 hours after Windows 10 launched, Microsoft announced in a blog post that over 14 million devices were now running Windows 10 (Mehdi). Unofficial reports put the install base at over 25 million after one week and at least 50 million after 2 weeks (Sams, Mediati). At the end of August, four weeks after launch, Microsoft's Corporate Vice President of Marketing for Windows on Devices, Yusuf Mehdi, announced that Windows 10 had been installed 75 million times. Windows 8 and Windows 7 are both estimated to have sold 40 million licenses after about a month while Windows Vista and Windows XP sold 20 million licenses and 17 million, respectively, in the same time period after launch (Newman, "Four weeks after launch"). These numbers, however, seem to only represent sales of the operating system itself, not new hardware that comes with the operating system pre-installed, which might favor Windows 10 because of the free upgrade offer since it would push users to simply

upgrade their older hardware instead of buying new computers. Based on these numbers, it would appear that Windows 10 was being well accepted.

Physical sales numbers are subjective because the PC industry itself has changed so much between the releases of these various operating systems. The changing size of the market means that sales expectations for each of the various operating systems should be different. Windows 10 should be expected to have higher numbers than Windows XP simply because there are more computer users now than there were back in 2001. Therefore, comparing them solely based on the number of copies sold would not be a fair comparison. Instead, a fairer method would be to compare them based on total market share percentage. As a percentage, this method naturally accounts for the changing size of the PC market.

Two separate data sources are being used to measure the general market share of Operating Systems, Net Market Share and StatCounter. Both of these websites track market share by tracking page views on a large number of websites. This means not only that only active computers are polled, but it also means that only computers that are connected to the internet and happen to visit those websites get counted. For Net Market Share, their data is based on 160 million unique visitors spread over 40,000 websites per month, while StatCounter uses 15 billion page views over three million websites (Bott). It is worth noting that StatCounter's 15 billion page views sounds like a lot more than Net Market Share's 160 million unique visitors, but page views and unique visitors are very different. One visitor will likely view multiple pages on the same website, and it is unclear if StatCounter differentiates between visitors to make sure they are not counted more than once. It is also important to note that although these numbers seem rather huge, compared to overall internet traffic they are rather small. There are an estimated 861 million websites worldwide, so the number of websites polled by these two websites is not a proportionally large number (Bott). However, the amount of data is sufficient to give a good estimate on how many people are using each operating system. A testament to this is that, despite

result disagreements in many categories between the two websites, their data for operating systems line up historically (Bott). The author was able to gather data from Net Market Share from September 2013 onwards and from StatCounter as far back as July 2008. Because of the availability of their data, StatCounter's data has been used in previous sections of this report to look at historical trends in operating systems.

One notable issue with StatCounter's data is that early on they seemed to have included all types of operating systems, not just operating systems for personal computers, in their studies. However, they later appeared to have separated out the non-PC operating systems. This means that mobile operating systems like iOS and Android, as well as, consoles like PlayStation were included in the results for a certain time period before StatCounter started reporting them separately. This might skew the data somewhat; however, the amount is immaterial as none of those operating systems were significant (at its highest, iOS accounted for 2.64% of operating systems, while Android and PlayStation accounted for 1.45% and 0.13%, respectively) so it should not have any major effect on the study. However, it is worth noting the discrepancy.

To measure PC gamers separately, the Steam Hardware & Software Survey will be used. As previously mentioned, Steam is the most popular PC gaming platform. Their hardware survey, conducted monthly, asks random users to report their system specifications and then aggregates them to represent the computers of overall Steam users. The reason behind this seems to be to allow developers to see what hardware and software gamers are using so that they can optimize their games to reach a larger audience. Because the data for the previous month is the only data available, there is no way to analyze trends with historical data from several years. The author started recording Steam Hardware & Software Survey data monthly in July 2015, so there is no way to compare Windows 10's adoption rate to previous operating systems from Steam's perspective. However, the author has compiled enough data to compare Windows 10's usage rates against other operating systems reported

on Steam, as well as, against what operating systems the general populations of computer users are using.

The Analysis

Previous versions of Windows relied entirely on sales to drive their market share increases. People had to either buy copies of the operating system and install them on their existing hardware or buy new computers for market share numbers to increase. However, the fact that Windows 10 is a free upgrade changes everything. It is reasonable to expect that Windows 10's market share should grow a lot faster than older versions of Windows, just because there are much fewer obstacles for customers to upgrade. Since users do not need to invest additional money to upgrade, they should be expected to be more likely to perform the upgrade. Of course, there is still the cost of time spent upgrading (which could take around an hour, depending on many different factors). However, the free upgrade offer would be expected to encourage a higher percentage of people to upgrade who are satisfied with Windows 7 or 8 and normally would not spend money to buy Windows 10 to actually upgrade.

Figure 3 displays the first 12 months after the release of Windows 7 and Windows 8 using data from StatCounter. It also shows data from both StatCounter and Net Market Share for Windows 10 since its release and until the time of writing. Month 0 is the month that the operating system released. The graph charts the growth of market share, in percentage form, for each operating system.

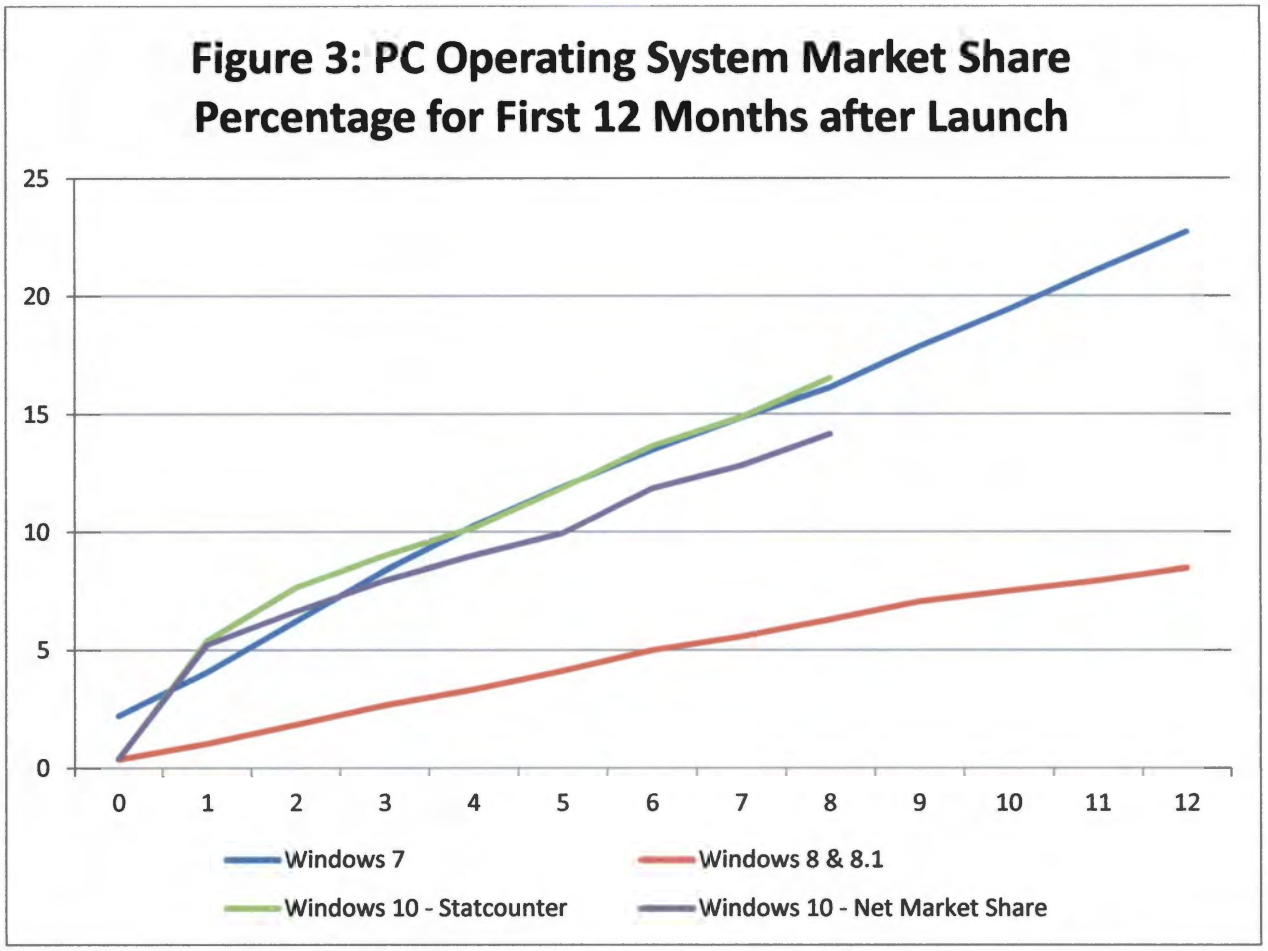

Figure 3: "StatCounter Global Stats;" "Desktop Operating System Market Share;"

The graph shows that Windows 7, after release, had fairly straight-line growth after launch, climbing to 22.71% market share after 12 months. It is important to note that Windows 7 started out quite a bit ahead of the other operating systems in their first months. Windows 7 was already at around 2.21% while all the others hovered around 0.35%. The underlying reason is likely because Windows 7 was released to the general public in October 2009 but made available to manufacturers in July of that year. As a result, it already enjoyed an install base before it officially launched. Like 7, Windows 8 had fairly straight-line growth, but it did not climb nearly as high as Windows 7 after 12 months, only reaching 8.47% (counting both Windows 8 and Windows 8.1 combined). It is worth noting that Windows 8.1 was released 12 months after Windows 8's launch. However, looking at Windows 8's market

percentage over a 12-month period shows that Windows 8.1's release did not make any significant long-term increase to their combined market share, as shown in Figure 4 below.

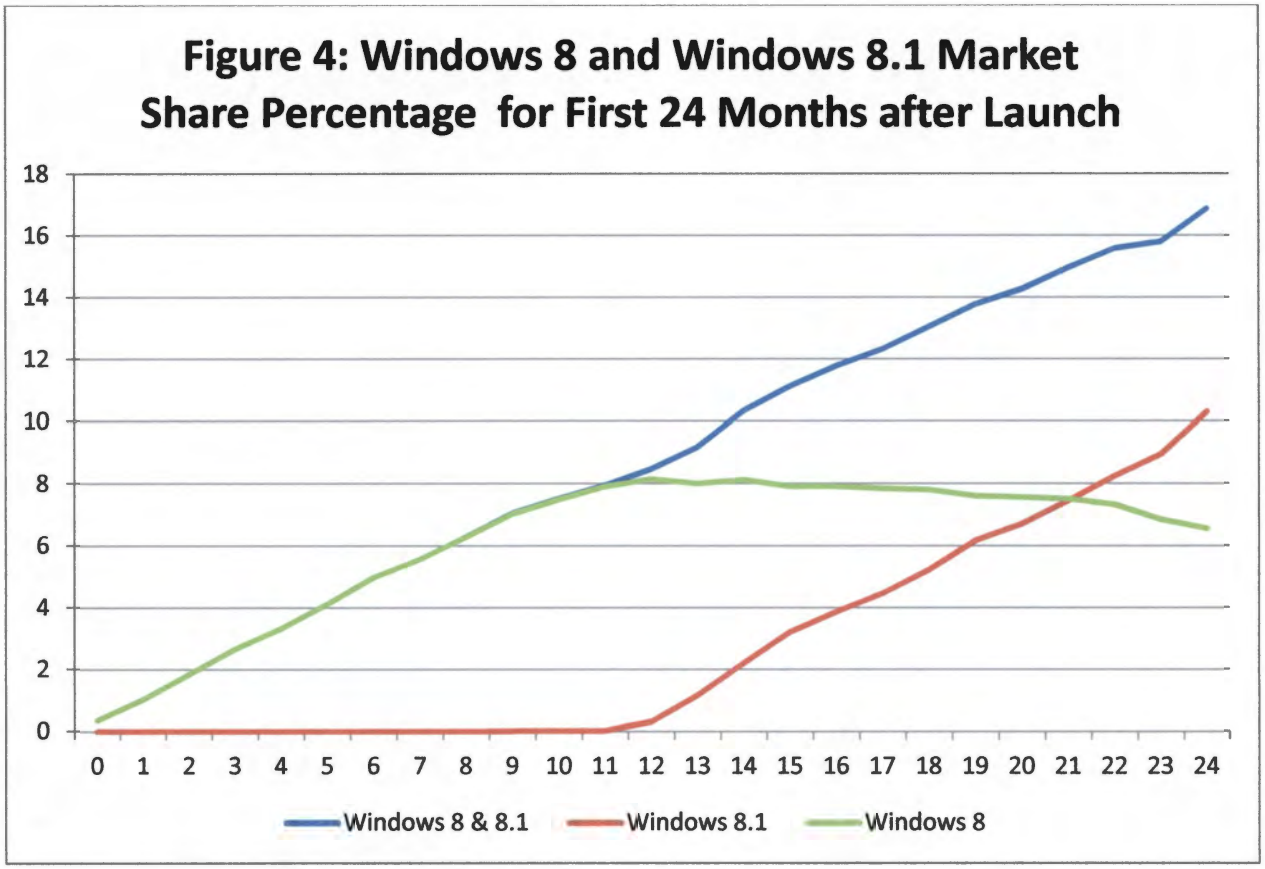

Figure 4: "StatCounter Global Stats;"

Looking at the two different data lines for Windows 10 reveals an interesting story. During its first month, Windows 10 shot above Windows 7 in terms of market share, rising from around 0.36% at the end of July 2015 to over 5% by the end of August, according to both StatCounter and Net Market Share. In that time period, Windows 7, despite having a lead with over 2% of the market share at the end of its release month, only rose to just over 4%. Using that slope as a projection line, Windows 10 should have achieved an astounding 60% of the market share in just 12 months.

However, that was not the case, as shortly after that Windows 10's numbers start to taper off. Of course, that should be expected, as the initial boost was likely caused by the hype around the operating system's launch. Such a spike at the beginning of the operating system's life is non-existent for

either Windows 7 or 8. This seems to have been influenced by the fact that Windows 10 was a free upgrade and the resulting lowered cost to the user to upgrade to it. After this initial spike, Windows 10's graph starts to taper off. StatCounter's data shows Windows 10 slowly falling back in line with Windows 7 by the 4th month, almost lining up perfectly since then until March 2016 when it broke ahead a bit. On the other hand, Net Market Share's data shows Windows 10's numbers dropping below Windows 7's after the third month, after which it has stayed a few percentage points below until the time of this writing. It's interesting that despite Microsoft changing the Windows 10 upgrade to a recommended status in order to force more users to upgrade in early 2016, there does not seem to be any major bump in Windows 10's market share.

This does not support the initial hypothesis that Windows 10 would rise faster than other operating systems. However, it is still impressive that Windows 10 was able to keep up with Windows 7 during their first 12 months. Windows 7's meteoric rise is impressive in and of itself as many users were despairing to abandon Windows Vista or were needing to upgrade their XP systems and were awaiting Windows 7's release which drove sales. So it is notable that Windows 10 has been able to rise similarly. Of course, the initial upgrade to Windows 10 could have been much better considering the free upgrade offer. The author suspects that the negative press surrounding the Windows 10's privacy issues, confusion over the upgrade offer, and overall distrust towards Microsoft have slowed the rate of upgrades.

It is, however, important to note that Windows 10 has become the second most-used Desktop Operating System as of February 2016, beating out the combined statistics for Windows 8 and 8.1 ("StatCounter Global Stats"; "Desktop Operating System Market Share"). That is remarkable in only seven months after release. As a comparison, it took Windows 7 ten months to surpass Windows Vista in usage to claim the second place spot. Of course, Vista was just under 18% when Windows 7 eclipsed it in August 2010 while Windows 8 and 8.1 combined were around 14.5% when Windows 10 trumped

them. Although "second most-used operating system" is an auspicious title for an OS as young as Windows 10, it really just comes down to how the market has changed. Figure 5 shows the PC Market Share from Windows 10's release month, July 2015, to March 2016.

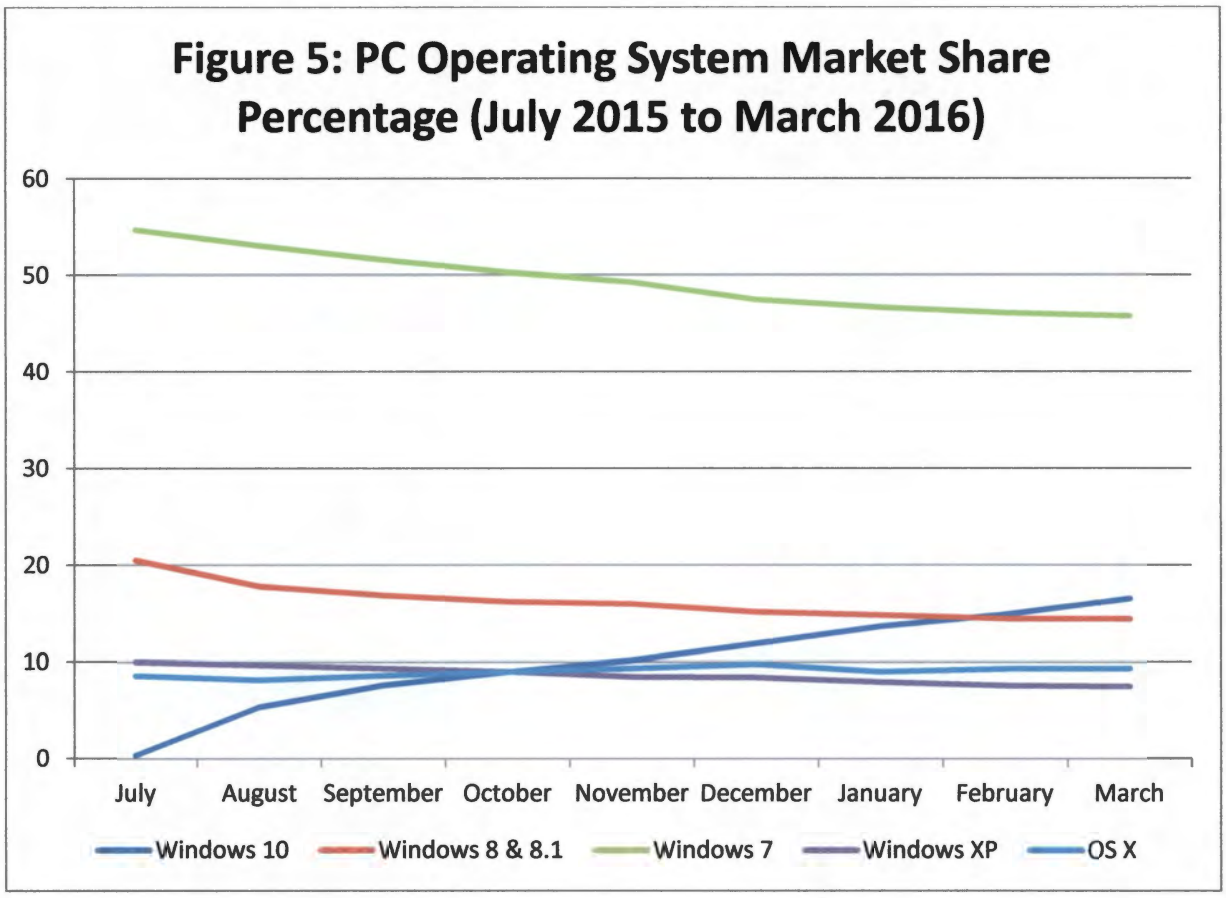

Figure 5: "StatCounter Global Stats;"

Despite that the data does not support the hypothesis, Windows 10 has still been appreciably successful. Presumably, usage rates will start to increase even faster as the cut-off date in July 2016 for the free offer approaches. Many users are likely waiting to ensure as many bugs and other issues are fixed before they take the jump while others have just been postponing the upgrade. After July 2016, we can expect that growth to quickly taper off as the free offer is rescinded and any increase to the user base will be by those actually spending money to purchase Windows 10. It will be interesting in the future to see how the situation develops.

PC Gaming Results

Moving on to the PC gaming market, the results are very different. The Steam Hardware & Software Survey shows that in February 2016, Windows 10 was not merely the second most used OS as it had become in the overall market, but also closing in on Windows 7. Figure 6 shows OS market share among Steam users from July 2015, the release month for Windows 10, to March 2016. Based on this, it can be expected that in April 2016, Windows 10 will be the most used Operating System on Steam. Also of note is that in September of 2015, Windows 10 became the second most used OS when it surpassed Windows 8.1.

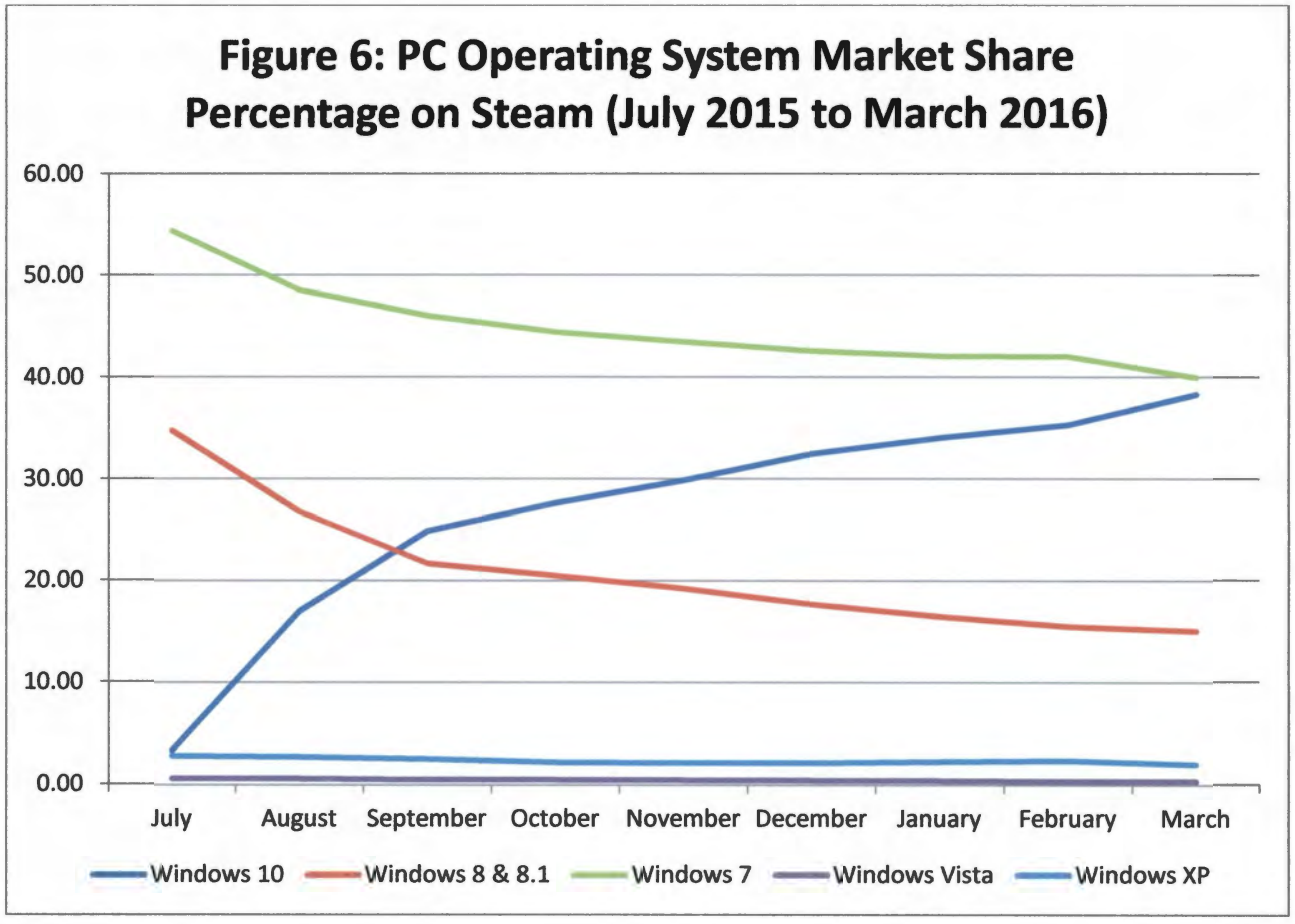

Figure 6: "Steam Hardware & Software Survey;"

Figure 7 compares Windows 10's usage on Steam versus the whole market using both data from StatCounter and Net Market Share. It illustrates Windows 10's meteoric rise on Steam as compared to

the general population of computer users. The author believes there are two possible reasons for this. Many Steam users probably wanted to experience the gaming advantages that Microsoft promised in their announcement hype. Also, PC gamers are generally more technologically adept than the average person, often building and upgrading their own computers and even modifying gaming software for the challenge or to make it to run smoother. Because of this, PC gamers are more likely to desire the cutting edge of technology and more willing to deal with bugs and other issues to stay on the edge.

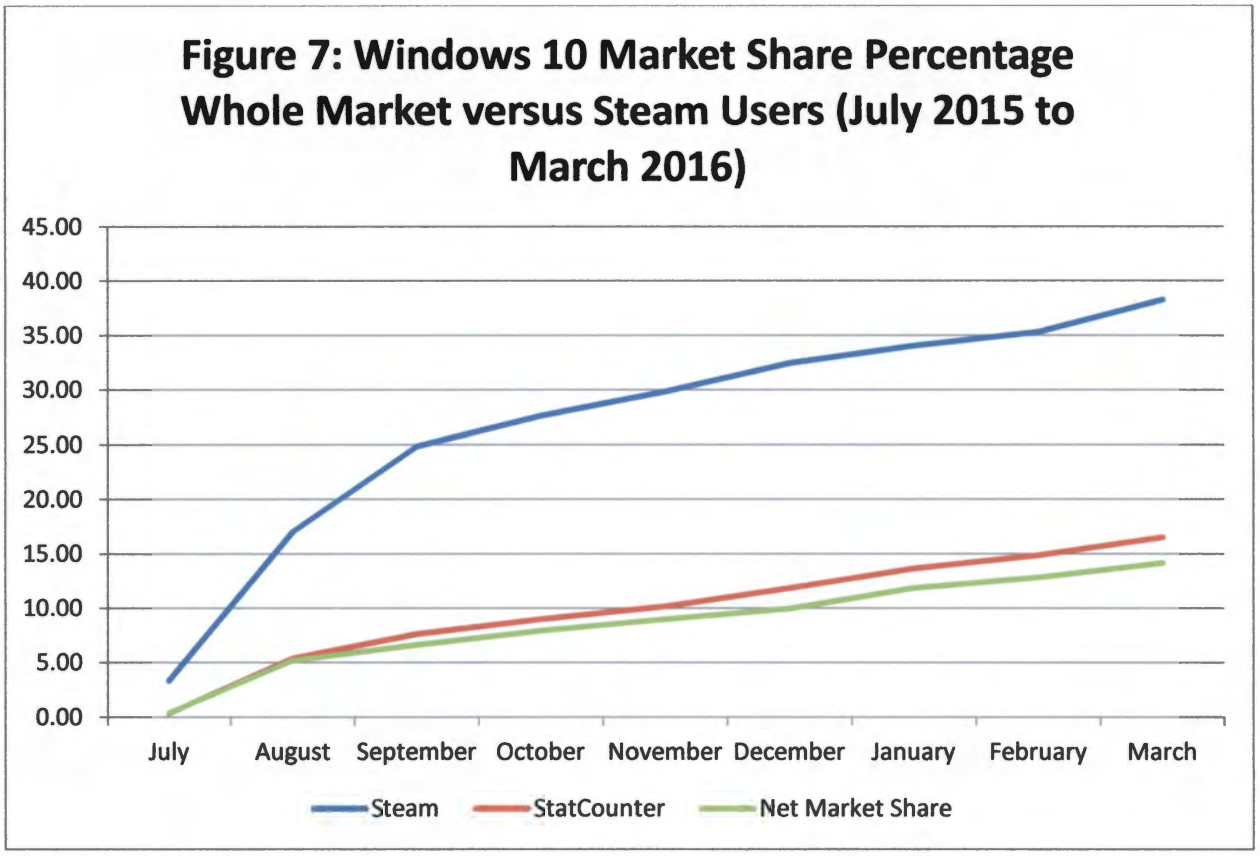

Figure 7: "Steam Hardware & Software Survey;" "StatCounter Global Stats;" "Desktop Operating System Market Share;"

How have Microsoft's promises about PC gaming turned out? The first DirectX 12 game arrived in the form of Gears of War: Ultimate Edition on March 1st, 2016, a port of an Xbox One game which in turn was a remaster of a 2006 Xbox 360 game. The game launched exclusively on the Windows 10 Store, meaning it could only be played on Windows 10. Unfortunately for Microsoft, the game was an unmitigated mess, filled with many issues and problems at launch, the most notorious being nearly

unplayable on high settings on high-end AMD video cards (Newman, "The first DirectX 12 game is here"). For the first representation of what gaming on DirectX 12 was like, this game was a huge failure. Although the problems with the game were not necessarily related to DirectX 12 (games release in a broken state quite often on the PC platform, usually due to rushed development), because it was the first representation of DirectX 12 to many gamers, the failure of this game is sure to damage Microsoft's reputation with astute PC gamers.

Another recently developed DirectX 12 game took advantage of the Universal Windows Application's ability to cross-develop for both Xbox One and PC at the same time. The game, Quantum Break, was released in disarray as well. The game seemed incapable of running at the monitor's refresh rate, instead the game stayed around 5/6th of the refresh rate no matter what hardware and settings were used, causing the game to stutter instead of running smoothly. Because Universal Windows Apps cannot be modified, users were unable to mod the game to make it more playable like most pc games (Hamilton). Because of the cross-platform development, some issues from the Xbox One are also unnecessarily present in the PC version. On Xbox One, the game runs extremely well but it is rendered in 720p and then up-scales the resolution to 1080p due to hardware limitations. The PC version does this as well, rendering it initially at 720p and then up-scaling it to whatever resolution the user chooses instead of simply rendering the game at the user's chosen resolution. This makes the game look unnecessarily blurry at higher resolutions such as 1440p or 4K even when the computer's hardware should be powerful enough to natively render the game at those resolutions (Carey). PC gamers typically complain that consoles hold back graphics technology and cause developers to not take full advantage of the PCs' graphics superiority. Although this is normally not entirely true, Quantum Break is one example where that allegation definitely happened.

Many of these issues appear to stem from the Windows 10 Store itself. In an article entitled "Why serious PC gamers should ignore the Windows Store," PCWorld contributor Ian Paul explained

how the "Universal Windows Apps," (i.e. the new software type that previously debuted with Windows 8 and were originally called "Metro Apps" that now represent apps that only work with Windows 10 and are distributed through the Windows Store), are "severely sandboxed." These types of apps have been especially terrible for video games as many important features like support for multiple graphic cards do not work while other less-desirable features like V-Sync cannot be turned off (Paul, "Why serious PC gamers should ignore"). Ironically, DirectX 12 has a much better multi-graphics cards feature than current methods, but at the time of writing it is unavailable for Universal Windows apps. Other seemingly basic features are not possible with Windows Store apps, like "true" full screen mode, interoperability with other programs, and modification support, the latter of which is a big draw to PC gaming (Thoman). For example the PC version of Rise of the Tomb Raider is available on both Steam and the Windows 10 store, but the Steam version has more graphical features and options than the Windows store version (Morrison). Phil Spencer, head of the Xbox division at Microsoft, said they are listening to feedback and promised to improve the Windows store gaming experience in the future, so hopefully these problems will be fixed (Chalk). However, future unfulfilled promises do not change the situation now, which leads Ian Paul to recommend that PC gamers ignore the Windows Store and stick to other digital game stores like Steam and Kotaku's Kirk Hamilton to suggest that the Universal Windows Platform is actually worse than the much maligned Games for Windows Live ("Why serious PC gamers should ignore"; "Quantum Break's PC Version").

So at the moment, Microsoft's gaming promises associated with Windows 10 seem to have resulted in major disappointment. But what about Valve's SteamOS? Was it able to make a big splash in the PC Gaming Industry? Unfortunately, it is hard to tell. SteamOS became available in beta form in December 2013 and at the time of this writing is still technically under development, with both beta and stable versions available ("SteamOS Community Tracker"). In the Steam Hardware & Software Survey, Valve does not list SteamOS numbers, just overall Linux numbers. In the time period since Windows 10's

release the percent of Linux users on Steam has stayed around .94% on average, declining from about 2% in March 2013 ("Steam Hardware & Software Survey"; Hoffman). Based only on that, it might initially appear that SteamOS has been a massive flop, as the percentage of Linux users has decreased by over half since before SteamOS's release. However, Steam's user base is growing rapidly. In October 2013, there were 65 million active Steam users, but by February 2015 there were 125 million, doubling in a year and a half (Hoffman). Despite the percentage of Linux users going down, the total number of users increased. Therefore, despite the percentage drop, the actual number of Linux users has still grown.

However, another issue keeps us from knowing how many people are using SteamOS. According to PC World, the Steam Hardware & Software Survey never polls people using Steam's Big Picture Mode, an alternate interface for Steam designed for users of gamepad controllers instead of a mouse and keyboard, and Steam on SteamOS is always in Big Picture Mode (Hoffman). This seems strange that Valve would do this. It means that the Steam Hardware & Software Survey actually only represents the users that use Steam's default interface. Although this is likely the vast majority of users, it excludes some unique subsets of users, such as SteamOS users, users of Valve's Steam Controller (which requires Big Picture Mode to work), and those that game in a living-room environment on a TV, which was the reasoning behind Big Picture Mode in the first place (Hoffman). All of these things are big pushes that Valve is trying to use to change the entire PC Gaming Industry, so you would expect them to want to publicize the results of these initiatives in order to convince game developers that these are worthwhile endeavors. For instance, proving that SteamOS is growing in market share would help convince developers to bring more games to Linux. It does not make sense for Valve to exclude those numbers from their Hardware Survey, but yet they still do.

Conclusions

Overall, Windows 10 has been very successful so far. It was able to rise above the disappointment of Windows 8 and return the operating system series to its much more user-focused

roots. While it has not been given a unanimous thumbs-up with some criticism still leveled at it, for the most part Windows 10 is fairly well liked by its users. Its increase in market share, on par with Windows 7, shows that users appreciate when Microsoft gives them what they want.

That is what is most important here. The Microsoft company seems to have learned a valuable lesson through all of this and has apparently changed its focus to be more compatible with the desires of the end user. With such a major dominance within this industry, Microsoft could easily lord over it with anti-consumer tactics and with full knowledge that there are not many other viable alternatives threatening their position. That's what Microsoft seemed to do with Windows 8: giving users what Microsoft wanted instead of listening to what users liked about previous Windows versions. However, since the release of Windows 8 and the backlash surrounding it, Microsoft has made the effort to determine what consumers want and to deliver that. It started with Windows 8.1, where Microsoft tried to fix some of the glaring problems with Windows 8. However, with Windows 10, Microsoft has had an even more increased focus on customer feedback, starting with the Windows Insider Program. Perhaps the slow decline of the computer industry made Microsoft realize that their main business model was going to eventually fail if they did not work together with the customers who still loved and relied upon traditional personal computers instead of tablets and smartphones. Not everything has worked, most noticeably with Microsoft's attempts at reaching out to PC gaming, but perhaps the feedback from their first efforts will help put them on the right track. Overall, this new customer-friendly Microsoft spells good things for the future. Hopefully, Windows 10 is just the first of many successful initiatives to come out of this new focus.

Works Citied

Ackerman, Dan. "Microsoft Windows 8.1 review: Improved Windows still torn between tablet future and PC past." *CNET*. 17 October 2013. Web. 26 April 2016.

"After Two Years of Decline, Worldwide PC Shipments Experienced Flat Growth in Second Quarter of 2014, According to Gartner." 9 July 2014. Web. 29 April 2016.

Bott, Ed. "Net Market Share vs. StatCounter: Whose online measurements can you trust?" *ZDNet*. 5 Jan. 2014. Web. 27 April 2016.

Bulik, Beth Snyder. "Microsoft Pumps $500 Million Into Vista Marketing Campaign." *AdvertisingAge*. 29 Jan. 2007. Web. 25 April 2016.

Carey, Gabe. "Quantum Break Issues Persist on PC, and Some of Them are Here to Stay." *Digital Trends*. 14 April 2016. Web. 28 April 2016.

Case, Loyd. "Windows 8: The official review." *PCWorld*. 25 Oct. 2012. Web. 26 April 2016.

Cawley, Christian. "Understanding Windows - The History of Windows." *Bright Hub*. 18 May 2011. Web. 25 April 2016.

Chacos, Brad. "7 ways Windows 10 pushes ads at you, and how to stop them." *PCWorld*. 3 March 2016. Web. 26 April 2016.

Chacos, Brad. "AMD's low-level Mantle graphics could mean big things for PC gaming." *PCWorld*. 27 Sept. 2013. Web. 27 April 2016.

Chacos, Brad. "Deflating Apple's hubris: Why 600 million people using 5-year-old PCs is a great thing". *PCWorld*. 23 March 2016. Web. 28 April 2016.

Chacos, Brad. "Windows 10 is a free upgrade for Windows 7 and Windows 8 users." *PCWorld*. 29 July 2015. Web. 25 April 2016.

Chacos, Brad. "You will upgrade to Windows 10: Inside Microsoft's strong-arm upgrade tactics." *PCWorld*. 2 Feb. 2016. Web. 26 April 2016.

Chalk, Andy. "Microsoft promises to improve the Windows Store". *PC Gamer*. 29 Feb. 2016. Web. 28 April 2016.

Cobbett, Richard. "Why Windows 10 isn't the PC gaming saviour it's cracked up to be." *TechRadar*. 25 July 2015. Web. 26 April 2016.

Coursey, David. "Top 10 things you MUST know about Win XP." *ZDNet*. 25 October 2001. Web. 25 April 2016.

Davis, Jarvis. "Microsoft Windows 10 Announcement - Initial Impressions." *CDW Solutions Blog*. CDW. 30 Sept. 2014. Web. 26 April 2016.

Derene, Glenn. "The View From Windows Vista." *Popular Mechanics*. April 2006. *MasterFILE Premier*. Web. 25 April 2016.

Dransfield, Ian. "Games for Windows 'wasn't the right approach' says Microsoft". *PC Gamer*. 6 August 2015. Web. 27 April 2016.

"Desktop Operating System Market Share." *Net Market Share*. n. d. Web. 28 April 2016.

Ferguston, Tim. "Windows 7 now fastest-selling Windows OS." *ZDNet*.27 April 2010. Web. 29 April 2016.

Forrest, Conner. "Windows 10 violates your privacy by default, here's how you can protect yourself." *TechRepublic*. 4 Aug. 2015. Web. 26 April 2016.

Frank, Blair Hanley. "Windows 10's launch was a bit bumpy, but people seem to like it." *PCWorld*. 30 July 2015. Web. 26 April 2016.

"Gartner Says Worldwide PC Shipments Declined 5.2 Percent in First Quarter 2015." 9 April 2015. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments Declined 6.9 Percent in Fourth Quarter of 2013." 9 Jan. 2014. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments Declined 7.7 Percent in Third Quarter 2015." 8 Oct. 2015. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments Declined 8.3 Percent in Fourth Quarter of 2015." 12 Jan. 2016. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments Declined 8.3 Percent in First Quarter of 2016." 11 April 2016. Web. 2 May 2016.

"Gartner Says Worldwide PC Shipments Declined 9.5 Percent in Second Quarter of 2015." 9 July 2015. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments Grew 1 Percent in Fourth Quarter of 2014." 12 Jan. 2015. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments in the First Quarter of 2013 Drop to Lowest Levels Since Second Quarter of 2009." 10 April 2013. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments in the First Quarter of 2014 Declined 1.7 Percent." 9 April 2014. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments in the Second Quarter of 2013 Declined 10.9 Percent." 10 July 2013. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments in the Third Quarter of 2013 Declined 8.6 Percent." 9 Oct. 2013. Web. 29 April 2016.

"Gartner Says Worldwide PC Shipments in the Third Quarter of 2014 Declined 0.5 Percent." 8 Oct. 2014. Web. 29 April 2016.

Grabham, Dan. "Windows 10 review." *TechRadar*. n.d. Web. 26 April 2016.

Hachman, Mark. "A tribute to Windows 8: If it hadn't been so bad, Windows 10 wouldn't be so good." *PCWorld*. 21 July 2015. Web. 26 April 2016.

Hachman, Mark. "HP chief: Windows 10 hasn't driven the PC demand that the company was counting on." *PCWorld.* 25 Feb. 2016. Web. 25 April 2016.

Hachman, Mark. "Windows XP passes away and millions of fans mourn." *PCWorld.* May 2014. *MasterFILE Premier.* Web. 25 April 2016.

Hamilton, Kirk. "Quantum Break's PC Version Sure Sounds Broken". *Kotaku.* 8 April 2016. Web. 28 April 2016.

Hoffman, Chris. "Linux gaming is much healthier than Steam's Hardware Survey implies". *PCWorld.* 21 May 2016. Web. 28 April 2016.

Horowitz, Michael. "The main problem with Windows Vista." *CNET.* 8 Sept. 2008. Web. 25 April 2016.

Jackson, Joab. "After Windows 8 debacle, PC makers have high hopes for Windows 10." *PCWorld.* 29 July 2015. Web. 25 April 2016.

Larkin, Erik. "Vista Resistance: Why XP Is Still So Strong." *PCWorld.* 25 Sep. 2016. Web. 26 April 2016.

Makuch, Eddie. "Steam Reaches New Concurrent User Record." *GameSpot.* 1 Nov. 2015. Web. 26 April 2016.

McCracken, Harry. "Windows 7 Review." *PCWorld.* 19 Oct. 2009. Web. 26 April 2016.

McMillan, Robert. "No Rush to Adopt Vista." *PCWorld.* 28 Dec. 2006. Web. 25 April 2016.

Mediati, Nick. "Report: 50 million devices now run Windows 10." *PCWorld.* 16 Aug. 2016. Web. 27 April 2016.

Mehdi, Yusuf. "Windows 10 - The First 24 Hours." *Windows Blog.* Microsoft. 30 July 2015. Web. 27 April 2016.

"Microsoft reveal cross-platform plans for ~~Windows~~Windows 10, Xbox One." *GamesRadar.* 4 March 2015. Web. 27 April 2016.

"Microsoft Support Lifecycle". *Microsoft*. Web. 26 April 2016.

Miller, Michael. "A Brief History of Microsoft Windows." *Que*. 2 Aug. 2009. 25 April 2016.

Morrison, Angus. "Rise of the Tomb Raider patch expands graphics options". *PC Gamer.* 5 Feb. 2016. Web. 28 April 2016.

Musil, Steven. "HP resurrects Windows 7 PCs 'by popular demand'." *CNET*. 20 Jan. 2014. Web. 26 April 2016.

Myerson, Terry. "Announcing Windows 10." *Windows Blog.* Microsoft. 30 Sept. 2014. Web. 26 April 2016.

Newman, Jared. "Four weeks after launch, Windows 10 is already on 75 million PCs and tablets." *PCWorld.* 26 Aug. 2015. Web. 27 April 2016.

Newman, Jared. "The first DirectX 12 game is here as Gears of War crash lands on Windows 10 with issues galore." *PCWorld.* 1 Mar. 2016. Web. 27 April 2016.

Paul, Ian. "Why serious PC gamers should ignore the Windows Store." *PCWorld*. 26 Feb. 2016. Web. 28 April 2016.

Paul, Ian. "Windows XP holdouts: Meet the diehard faithful who refuse to move on." *PCWorld.* 7 April 2014. Web. 26 April 2016.

Paul, Ian. "Windows XP: Pros and Cons of Not Upgrading." *PCWorld*. 26 Oct 2011. Web. 26 April 2016.

Protalinski, Emil. "Microsoft brings Universal Windows Platform apps to Xbox One." *Venture Beat*. 30 March 2016. Web. 27 April 2016.

Ralph, Nate. "Microsoft Windows 10 review: Microsoft gets it right." *CNET*. 28 July 2015. Web. 26 April 2016.

Reynolds, Rich. "Celebrate a Decade of Windows XP by Moving to Windows 7." *Windows Blog.* Microsoft. 10 Oct. 2011. Web. 26 April 2016.

Ron. "Microsoft has a renewed focus on PC gaming on the heels of DirectX 12 announcement." *WinBeta*. 26 March 2014. Web. 27 April 2016.

Sams, Brad. "Windows 10 is running on more than 25 million devices." *Neowin.* 7 Aug. 2015. Web. 27 April 2016.

Sawaya, Samer. "How Windows Insider Feedback Influences Windows 10 Development." *Windows Blog.* Microsoft. 12 June 2015. Web. 26 April 2016.

Shaw-Williams, Hannah. "92% of PC Video Game Sales are Digital Downloads." *GameRant.* 2014. Web. 26 April 2016.

Sherr, Ian. "Microsoft to offer Xbox app on Windows 10, advancement for gamers." *CNET.* 21 Jan. 2015. Web. 27 April 2016.

Silver, Michael A. "Windows 8 Announcement Should Not Delay Windows 7 Deployment Plans". *Gartner.* 8 June 2011. Web. 26 April 2016.

Smith, Matt. "As PC Sales Dwindle, High-End Builders Find That Gamers Aren't Going Anywhere." *Digital Trends*. 9 Feb. 2014. Web. 26 April 2016.

Smith, Ryan. "Valve to Showcase SteamVR Hardware, Steam Machines, & More at GDC 2015." *AnandTech*. 23 Feb. 2015. Web. 26 April 2016.

"StatCounter Global Stats." *StatCounter.* n. d. Web. 28 April 2016.

"Steam Hardware & Software Survey." *Steam.* Valve. n. date. Web. 28 April 2016.

"Steam Search." *Steam.* n. d. Web. 8 March 2016.

"SteamOS Community Tracker". *Github.* Valve. n. d. Web. 28 April 2016.

Thoman, Peter. "Why PC games should never become universal 'apps'". *PC Gamer.* 7 March 2016. Web. 28 April 2016.

Wilde, Tyler. "The pros and cons of SteamOS." *PC Gamer.* 24 Sept. 2013. Web. 27 April 2016.

Wilde, Tyler. "Will Windows 10 be good for gaming?" *PC Gamer.* 22 Jan. 2015. Web. 27 April 2016.

"Windows 7 Review: XP vs Vista vs 7 in 80+ Benchmarks." *MaximumPC.* 18 October 2009. Web. 16 April 2016.